

cls 117
JW-36.9

CLAIMS

What is claimed is:

Subj 1. An abrasion resistant tubular article comprising an inner wall and an outer wall disposed therearound wherein the inner wall comprises polytetrafluoroethylene, and wherein the outer wall comprises polytetrafluoroethylene and an inorganic filler.

b 2. The *article* of claim 1 wherein the outer wall comprises from about 10 to about 95 wt.% polytetrafluoroethylene and from 10 about 5 to about 90 wt.% inorganic filler.

b 3. The *article* of claim 1 wherein the outer wall comprises from about 60 to about 90 wt.% polytetrafluoroethylene and from about 10 to about 40 wt.% inorganic filler.

b 4. The *article* of claim 1 wherein the inner wall further comprises an organic filler.

b 5. The *article* of claim 4 wherein the inner wall comprises from about 60 to about 98 wt.% polytetrafluoroethylene and from 20 about 2 to about 40 wt.% organic filler.

b 6. The *article* of claim 4 wherein the inner wall comprises from about 75 to about 95 wt.% polytetrafluoroethylene and from 25 about ⁵ ~~10~~ to about 25 wt.% organic filler.

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7. The Assembly ~~article~~ of claim 1 wherein the inorganic filler is selected from the group consisting of carbon fibers, carbon powder, graphite, coke flour, amorphous glass, glass fibers, glass spheres, milled glass, bronze, iron powder, iron oxide, silicon dioxide, boric oxide, zirconium oxide, and molybdenum disulfide and combinations of two or more of these.

8. The assembly of claim 4 wherein the organic filler is selected from the group consisting of aromatic polyesters, thermoplastic or thermosetting polyamide, polyimide, and polyamide imide resins, polyetherimides, polyether ketones, polyether ether ketones, polysufones, polyether sulfones, polyphenylene sulfones, polyphenylene sulfides, polysulfide imides and combinations of two or more of these.

9. The assembly of claim 1 wherein the inner wall comprises from about 5 to about 50% of the total thickness thereof.

10. The assembly of claim 1 wherein the inner wall comprises about 10 to about 25% of the total thickness thereof.

2 21. The ~~article~~ ^{assembly} of claim 4 further comprising a layer of
polytetrafluoroethylene disposed between the inner wall and the
outer wall thereof.

12. An abrasion-resistant tubular article comprising an inner-

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cont. wall and an outer wall disposed therearound wherein the inner wall comprises from about 75 to about 90 wt.% polytetrafluoroethylene and from about ~~10~~⁵ to about ~~25~~¹⁰ wt.% organic filler, and wherein the outer wall comprises from about ~~60~~⁸ to about 90 wt.% polytetrafluoroethylene and from about ~~10~~¹⁰ to about 40 wt.% inorganic filler.

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5 b 13. The *Assembly* of claim 12 wherein the inorganic filler is selected from the group consisting of carbon fibers, carbon powder, graphite, coke flour, amorphous glass, glass fibers, glass spheres, 10 milled glass, bronze, iron powder, iron oxide, silicon dioxide, boric oxide, zirconium oxide, and molybdenum disulfide and combinations of two or more of these.

15 b 14. The *Assembly* of claim 12 wherein the organic filler is selected from the group consisting of aromatic polyesters, thermoplastic or thermosetting polyamide, polyimide, and polyamide imide resins, polyetherimides, polyether ketones, polyether ether ketones, polysufones, polyether sulfones, polyphenylene sulfones, polyphenylene sulfides, polysulfide imides and combinations of two 20 or more of these.

20 b 15. The *Assembly* of claim 12 wherein the inner wall comprises from about 5 to about 50% of the total thickness thereof.

25 b 16. The *Assembly* of claim 12 wherein the inner wall comprises from about 10 to about 25% of the total thickness thereof.

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17. The assembly of claim 12 further comprising a layer of polytetrafluoroethylene disposed between the inner wall and the outer wall thereof.

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class 156 in 264
5. 18. A method of making an abrasion resistant multi-wall tubular article comprising the steps of:

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premixing a first composition of polytetrafluoroethylene, an inorganic filler, and an extrusion aid material;

10 premixing a second composition of polytetrafluoroethylene and an extrusion aid material;

arranging the first composition and the second composition in a preform so that the first composition is disposed in a coaxial arrangement about the second composition;

15 ram extruding the preform under pressure to form an extruded article; and

heating the extruded article in an oven to a temperature above the melt temperature of the extruded article.

20. 19. The method of claim 18 wherein the second composition further comprises an organic filler.

20. The method of claim 19 wherein the arranging step further comprises the disposition of a third composition comprising polytetrafluoroethylene and an extrusion aid material in a coaxial arrangement between the first composition and the second composition in the preform.

21. The method of claim 18 further comprising the step of heating the extruded article to a temperature sufficient to volatilize off substantially all of the extrusion aid material said step occurring prior to heating the extruded article to a 5 temperature above the melt temperature of the extruded article.

22. The method of claim 21 wherein the second composition further comprises an organic filler.

10 23. The method of claim 22 wherein the arranging step further comprises the disposition of a third composition comprising polytetrafluoroethylene and an extrusion aid material in a coaxial arrangement between the first composition and the second composition in the preform.

